IN THE CLAIMS

Please cancel claims 3 and 8, amend claims 1, 4, 9-17 and 19-23 as follows:

1. (CURRENTLY AMENDED) A signal convertor for [modulating or demodulating] emulating the modulation or demodulation of an input signal x(t), with a local oscillator signal having frequency f, said signal convertor comprising:

a synthesizer for generating wideband mixing signals ϕ_1 and ϕ_2 which vary irregularly over time, where:

$\phi_1 * \phi_2$ has significant power at the frequency f of [a] said local oscillator signal being emulated;

neither ϕ_1 nor ϕ_2 has significant power at the frequency f of said local oscillator signal being emulated; and

said mixing signals ϕ_1 and ϕ_2 are designed to emulate said local oscillator signal having frequency f;

a first mixer coupled to said synthesizer for mixing said input signal x(t) with said mixing signal ϕ_1 to generate an output signal $x(t)\ \phi_1$; and

a second mixer coupled to said synthesizer and to the output of said first mixer for mixing said signal $x(t)\ \phi_1$ with said mixing signal ϕ_2 to generate an output signal $x(t)\ \phi_1\ \phi_2$, said output signal $x(t)\ \phi_1\ \phi_2$ emulating the modulation or demodulation of said input signal x(t) with said local oscillator signal having frequency f;

said synthesizer being operable to shape the frequency spectrum of said mixing signals ϕ_1 and ϕ_2.

2. (ORIGINAL) The signal convertor of claim 1, where said synthesizer comprises:

a synthesizer for generating mixing signals ϕ_1 and ϕ_2, where ϕ_1 and ϕ_2 have different patterns.

3. (CANCELED)

4. (CURRENTLY AMENDED) The signal convertor of claim [[3]] 2 wherein said synthesizer further comprises:

a synthesizer for generating mixing signals ϕ_1 and ϕ_2, where $\phi_1 * \phi_1 * \phi_2$ does not have a significant amount of power within the bandwidth of said input signal x(t) at baseband, thereby reducing adverse effects of local oscillator leakage.

5. (ORIGINAL) The signal convertor of claim 4 wherein said synthesizer further comprises:

a synthesizer for generating mixing signals ϕ_1 and ϕ_2, where ϕ_2 and ϕ_2 does not have a significant amount of power within the bandwidth of said input signal x(t) at baseband, thereby reducing adverse effects of local oscillator leakage.

6. (ORIGINAL) The signal convertor of claim 1 wherein said synthesizer further comprises:

a synthesizer for randomly generating mixing signals ϕ_1 and ϕ_2.

7. (ORIGINAL) The signal convertor of claim 1 wherein said synthesizer further comprises:

a synthesizer for pseudo-randomly generating mixing signals ϕ_1 and ϕ_2.

8. (CANCELED)

9. (CURRENTLY AMENDED) The signal convertor of claim [[8]] 1 wherein said synthesizer further comprises:

a delta-sigma block for generating said mixing signals ϕ_1 and ϕ_2.

10. (CURRENTLY AMENDED) The signal convertor of claim 9 wherein [[the]] a control signal and oversampling rate of the delta-sigma block vary with time.

11. (CURRENTLY AMENDED) The signal convertor of claim [[7]] 9 wherein said ~~synthesizer further comprises:~~

~~a synthesizer for generating mixing signals ϕ_1 and ϕ_2, where said mixing signals ϕ_1 and ϕ_2 can change with time in order to reduce errors~~ delta-sigma block comprises a first-order delta-sigma block.

12. (CURRENTLY AMENDED) The signal convertor of claim [[7]] 1, further comprising:

a filter for removing unwanted signal components from said x(t) ϕ_1 signal.

13. (CURRENTLY AMENDED) The signal convertor of claim [[7]] 1, wherein said mixing signals ϕ_1 and ϕ_2 are digital waveforms.

14. (CURRENTLY AMENDED) The signal convertor of claim [[7]] 1, wherein said mixing signals ϕ_1 and ϕ_2 are square waveforms.

15. (CURRENTLY AMENDED) The signal convertor of claim [[7,]] 9 ~~further comprising:~~

~~a local oscillator coupled to said synthesizer for providing a signal having a frequency that is an integral multiple of the desired mixing frequency~~ wherein said delta-sigma block comprises a second-order delta-sigma block.

16. (CURRENTLY AMENDED) The signal convertor of claim [[7,]] 9 wherein said ~~synthesizer uses a single time base to generate both mixing signals ϕ_1 and ϕ_2.~~ delta-sigma block comprises a third or higher order delta-sigma block.

17. (CURRENTLY AMENDED) The signal convertor of claim [[7]] 9 wherein said ~~synthesizer further comprises:~~

~~a synthesizer for generating mixing signals ϕ_1 and ϕ_2, wherein ϕ_1 is at a much higher frequency than ϕ_2, thereby reducing the amount of 1/f noise in the output, at base band~~ delta-sigma block comprises:

a first summer;

a second summer;

an integrator; and

a quantizer;

said first summer comparing an input signal to an output of said quantizer to generate an error signal;

said second summer adding said error signal to an output of said integrator and feeding said added signal to an input of said integrator;

the output of said integrator being fed to an input of said quantizer; and

the output of said quantizer comprising the output of said delta-sigma block.

18. (ORIGINAL) The signal convertor as claimed in claim 7, wherein said first and second time-varying signals are periodic functions of time.

19. (CURRENTLY AMENDED) The signal convertor ~~as claimed in claim 7,~~ of claim 11 wherein said ~~synthesizer comprises:~~

~~a synthesizer for generating time-varying signals ϕ_1 and ϕ_2, where both ϕ_1 and ϕ_2 are operating at a much higher frequency than said local oscillator signal being emulated~~ first-order delta-sigma block comprises a 1-bit, first-order delta-sigma block.

20. (CURRENTLY AMENDED) A signal convertor comprising two signal paths as claimed in claim [[7]] 1, wherein said two sets of mixing signals are 90 degrees out of phase (ϕ_{1Q} and ϕ_{2Q} or ϕ_{1I} and ϕ_{2I}), thereby generating in-phase and quadrature components of said input signal x(t).

21. (CURRENTLY AMENDED) The synthesizer of claim [[7]] 1 comprising:

one or more additional signal generators for producing one or more additional time-varying signals;

where the product of all of said time-varying signals has significant power at the frequency of a local oscillator signal being emulated, and none of said all of said time-varying signals has significant power at the frequency of said local oscillator signal being emulated.

22. (CURRENTLY AMENDED) A method of ~~converting the frequency~~ emulating the conversion of a signal x(t) [[,]] with a local oscillator signal having frequency f, said method comprising the steps of:

generating wideband mixing signals ϕ_1 and ϕ_2 which vary irregularly over time, where:

$\phi_1 * \phi_2$ has significant power at the frequency f of [[a]] said local oscillator signal being emulated;

neither ϕ_1 nor ϕ_2 has significant power at the frequency f of said local oscillator signal being emulated; and

said mixing signals ϕ_1 and ϕ_2 are designed to emulate said local oscillator signal having frequency f, in a time domain analysis;

mixing said input signal x(t) with said mixing signal ϕ_1 to generate an output signal x(t) ϕ_1; [[and]]

mixing said signal x(t) ϕ_1 with said mixing signal ϕ_2 to generate an output signal x(t) ϕ_1 ϕ_2, said output signal x(t) ϕ_1 ϕ_2 emulating the modulation or demodulation of said input signal x(t) with said local oscillator signal having frequency f; and

shaping the frequency spectrum of said mixing signals ϕ_1 and ϕ_2.

23. (CURRENTLY AMENDED) A synthesizer for generating wideband mixing signals ϕ_1 and ϕ_2 which vary irregularly over time, to be input to successive mixers for modulating or demodulating an input signal x(t), said synthesizer comprising:

a first signal generator for [[producing]] generating a first wideband mixing signal ϕ_1 ~~which varies irregularly over time; and~~;

a second signal generator for [[producing]] generating a second wideband mixing signal ϕ_2, ~~which varies irregularly over time~~ where:

$\phi_1 * \phi_2$ has significant power at the frequency f of [[a]] said local oscillator signal being emulated;

neither ϕ_1 nor ϕ_2 has significant power at the frequency f of said local oscillator signal being emulated; and

said mixing signals ϕ_1 and ϕ_2 are designed to emulate said local oscillator signal having frequency f, in a time domain analysis;

said first and second signal generators being operable to shape the frequency spectrum of said wideband mixing signals ϕ_1 and ϕ_2.

24. (ORIGINAL) An integrated circuit comprising the device of claim 1.

25. (ORIGINAL) A computer readable memory medium, storing computer software code in a hardware development language for fabrication of an integrated circuit comprising the device of claim 1.

26. (ORIGINAL) A computer data signal embodied in a output wave, said computer data signal comprising computer software code in a hardware development language for fabrication of an integrated circuit comprising the device of claim 1.